

What is claimed is:

1. An intravascular occlusion balloon catheter, comprising:

an elongate shaft having a proximal end and a distal end;

a removable hub connected to the proximal end of the shaft;

an inflatable occlusion balloon connected to the distal end of the shaft; and

means for venting air from the balloon, the means disposed proximate the distal end of the shaft.

2. An intravascular occlusion balloon catheter as in claim 1, wherein the

venting means comprises:

an annular ring disposed about the distal end of the shaft; and

an intermediate tube fixedly connected to the balloon and movably disposed about the annular ring, the intermediate tube and the annular forming a seal, the intermediate tube having a vent hole, wherein a vent path is opened through the intermediate tube and the vent hole when the hole is positioned distal of the annular ring, and the vent path is closed when the hole is positioned proximal of the annular ring.

3. An intravascular occlusion balloon catheter as in claim 1, wherein the

venting means comprises:

an intermediate tube disposed between the balloon and the distal end of the shaft, the tube having an inflation lumen, a vent lumen and a vent hole; and

a movable plug disposed in the vent lumen, wherein a vent path is opened through the vent lumen and the vent hole when the plug is positioned proximal of the

hole, and the vent path is closed when the plug is positioned distal of the hole.

4. An intravascular occlusion balloon catheter as in claim 1, wherein the venting means further comprises a retainer disposed in the vent lumen distal of the vent hole to prevent the plug from entering the balloon.

5. An intravascular occlusion balloon catheter as in claim 1, wherein the venting means comprises:

an intermediate tube disposed between the balloon and the distal end of the shaft, the tube having an inflation lumen and a vent lumen; and

a re-sealable material disposed in the vent lumen, wherein a vent path is opened when a needle is disposed through the re-sealable material, and the vent path is closed when the needle is removed from the re-sealable material.

6. An intravascular occlusion balloon catheter as in claim 1, wherein the intermediate tube comprises a side-by-side dual lumen tube.

7. An intravascular occlusion balloon catheter as in claim 1, wherein the intermediate tube comprises an inner tube coaxially disposed in an outer tube and the vent lumen comprises an annular lumen therebetween.

8. An intravascular occlusion balloon catheter as in claim 1, wherein the venting means comprises:

a vent lumen extending from the balloon to a vent port; and

a sleeve slidably and coaxially disposed near the shaft distal end, the sleeve having a first position for occluding the vent port and a second position for allowing airflow from the vent port.

9. An intravascular occlusion balloon catheter as in claim 8, wherein the sleeve has a length, further comprising a first seal disposed proximal of the vent port and a second seal disposed distal of the vent port while the sleeve is in the first position, the first and second seals disposed a distance apart less than the sleeve length, the first and second seals having a height sufficiently small to fit between the sleeve and the shaft in the first position.

10. An intravascular occlusion balloon catheter as in claim 8, further comprising:

a vent lumen extending between the balloon and a first port disposed proximally of the balloon; and

a plug dimensioned for disposition within, and occlusion of, the vent lumen.

11. A distal occlusion device as recited in claim 10, wherein the plug is substantially radiopaque.

12. A distal occlusion device as recited in claim 10, wherein the vent lumen has a second port disposed between the balloon and the first port, wherein the plug has a

length to fit proximally of the second port within the second lumen for allowing flow from the balloon through the second port, and wherein the plug has a length sufficient to occlude the second port.

13. An intravascular occlusion balloon catheter, comprising:  
an elongate shaft having a proximal end and a distal end;  
a removable hub connected to the proximal end of the shaft;  
an inflatable occlusion balloon connected to the distal end of the shaft, the balloon having an interior; and  
a vent pathway disposed on the distal end of the shaft, the vent pathway in fluid communication with the interior of the balloon for venting air from the balloon.

14. An intravascular occlusion balloon catheter as in claim 13, further comprising:  
an annular ring disposed about the distal end of the shaft; and  
an intermediate tube fixedly connected to the balloon and movably disposed about the annular ring, the intermediate tube forming a seal with the annular ring, the intermediate tube having a vent hole therein, wherein the vent pathway is defined from the interior of the balloon, between the intermediate tube and the shaft to the annular ring, and through the vent hole.

15. An intravascular occlusion balloon catheter as in claim 13, further comprising:

an intermediate tube disposed between the balloon and the distal end of the shaft, the tube having an inflation lumen, a vent lumen and a vent hole; and

a movable plug disposed in the vent lumen, wherein the vent path is defined from the interior of the balloon, through the vent lumen to the movable plug, and through the vent hole.

16. An intravascular occlusion balloon catheter as in claim 10, further comprising a retainer disposed in the vent lumen distal of the vent hole to prevent the plug from entering the interior of the balloon.

17. An intravascular occlusion balloon catheter as in claim 13, further comprising:

an intermediate tube disposed between the balloon and the distal end of the shaft, the tube having an inflation lumen and a vent lumen; and

a re-sealable material disposed in the vent lumen, wherein the vent path is defined from the interior of the balloon and through a removable needle disposed in the re-sealable material.

18. A distal occlusion device comprising:

a tubular shaft having a proximal end, a distal region, an exterior, and an exterior wall;

an inflatable device disposed near the shaft distal region and having an interior;

a first lumen extending through the shaft and being in fluid communication with

the inflatable device interior;

a second lumen extending between the inflatable device interior and a first port disposed proximally of the inflation device; and

a plug dimensioned for disposition within, and occlusion of, the second lumen.

19. A distal occlusion device as recited in claim 18, wherein the plug is a formed of an elastomeric material.

20. A distal occlusion device as recited in claim 18, wherein the plug is formed in place in the second lumen by injecting a swellable polymeric material into the second lumen.

21. A distal occlusion device as recited in claim 18, wherein the plug is substantially radiopaque.

22. A distal occlusion device as recited in claim 18, wherein the second lumen has a second port disposed between the inflation device and the first port, wherein the plug has a length to fit proximally of the second port within the second lumen for allowing flow from the inflation device interior through the second port, and wherein the plug has a length sufficient to occlude the second port.

23. A method of using an intravascular occlusion balloon catheter in combination with a primary intravascular catheter having a guidewire lumen sized to

accommodate a guidewire therein, wherein the occlusion balloon catheter comprises an elongate shaft having an inflation lumen, a proximal end and a distal end, a removable hub connected to the proximal end of the shaft, and an inflatable occlusion balloon connected to the distal end of the shaft, the method comprising the steps of:

positioning the occlusion catheter in the guidewire lumen of the primary catheter;

inflating the balloon of the occlusion catheter;

occluding the inflation lumen at the proximal end of the shaft of the occlusion catheter;

removing the hub from the shaft of the occlusion balloon catheter; and

removing the primary catheter from the occlusion balloon catheter such that the occlusion balloon catheter is disposed in the guidewire lumen of the primary catheter.

24. A method of using an intravascular occlusion balloon catheter as in claim 23, wherein the occlusion balloon catheter further includes a means for venting air from the balloon, the means disposed on the distal end of the shaft, the method further comprising the step of venting air from the balloon prior to intravascular insertion.